

REMARKS

Claim 1 has been amended to correct an informality. Support for the amendment to claim 1 may be found in the specification at paragraph [0007]. No new matter has been added. Upon entry of this Amendment, claims 1-23 remain pending in this application.

Applicants acknowledge with appreciation that the previously applied restriction to the claims has been withdrawn.

In the Office Action dated November 9, 2004, the drawings were objected to. Applicants are submitting formal drawings herewith. Accordingly, Applicants respectfully request that the objection be withdrawn.

In the Office Action, Claims 20-22 were rejected under 35 U.S.C. § 102(b) as being anticipated by Narushima (WO99/28957). Applicants respectfully traverse this rejection.

Independent claim 20 recites a reference frame for use in a lithographic apparatus that includes a material having a coefficient of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$ . Narushima cannot anticipate claim 20, because it does not disclose every feature of claim 20. Narushima discloses a substrate retaining apparatus that uses a ceramic material of a low thermal expansibility. (Narushima at abstract.) Applicants respectfully request the Examiner to clarify if he is relying on the theory of inherency and/or Official Notice with respect to claims 20-22. If the Examiner is relying on inherency, Applicants respectfully request the Examiner to produce a basis in fact or technical reasoning why that features are necessarily present (MPEP §2112) or withdraw the rejection. If the Examiner is relying on Official Notice, Applicants respectfully request the Examiner to produce evidence to support such an assertion (MPEP §2144.03) or withdraw the rejection.

Moreover, the English abstract of Narushima does not define what is meant by "a ceramic material with a low thermal expansibility." Applicants respectfully submit that ceramic materials encompass a wide range of materials with a wide range of properties, and that ceramic materials with a low thermal expansion are a particular class of ceramic materials. As discussed in the specification of the present application, materials with a low coefficient of thermal expansion are used to make conventional reference frames. One of ordinary skill in the art would understand that a material having a coefficient of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$  would not fall in the category of a material with a low thermal expansion coefficient. Accordingly, Applicants submit that Narushima does not anticipate claim 20 and claims 21 and 22 that depend from claim 21, and respectfully request

that the rejection be withdrawn. If the rejection is to be maintained, Applicants respectfully request the Examiner to provide a reference that shows "that it is well known in the art that the coefficient of thermal expansion of the ceramic material [with a low thermal expansibility] is about  $3 \times 10^{-6}/K$ ."

In the Office Action, claims 1-3, 6-10, and 12-23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Novak et al. (U.S. Patent No. 6,674,512) in view of Trost (U.S. Patent Application Publication No. 2002/0154839). Applicants respectfully traverse this rejection.

Independent claim 1 recites a lithographic apparatus that includes, *inter alia*, "a reference frame that provides a reference surface with respect to which a position of at least one of said substrate and said patterning structure is measured, wherein said reference frame comprises a material having a coefficient of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$ ." The combination of Novak et al. and Trost does not teach all of the features of claim 1.

Novak et al. discloses an interferometer system for a semiconductor exposure system. The part MR discussed in Novak et al. is a reference *mirror* (Novak et al. at col. 1, lns. 25-28), and not a reference *frame* as recited by claim 1.

Trost discloses a kinematic stage assembly that includes a stage mirror 202. Stage mirror 202 is not a reference frame, as recited by claim 1. Moreover, Trost discloses that the stage mirror (202) is "formed from a ceramic material having a very low coefficient of thermal expansion, such as ZERODUR®." (Trost at [0039].) ZERODUR® is well known in the art to have a very low, i.e. less than about  $0.10 \times 10^{-6}/K$ , coefficient of thermal expansion. Because materials with very low coefficients of thermal expansion do not have coefficients of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$ , Trost does not teach this recited feature of claim 1.

Moreover, Applicants recognize in their specification that "[r]eference frames are conventionally made from materials having a low coefficient of thermal expansion, such as alloys including INVAR™" ([0004]), and that INVAR™ has a coefficient of thermal expansion of  $1.5 \times 10^{-6}/K$ . (Table 1.) Hence, materials having coefficients of thermal expansion of greater than  $2.9 \times 10^{-6}/K$  do not include a material that has a "low coefficient of thermal expansion."

Accordingly, Applicants submit that a *prima facie* case of obviousness has not been established by the Examiner, and respectfully request that the rejection to claim 1, and claims 2,3, 6-10, and 12-19 that depend from claim 1, be withdrawn.

As discussed above, independent claim 20 recites a reference frame for use in a lithographic apparatus that includes a material having a coefficient of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$ . Neither Novak et al. nor Trost disclose a reference frame, not to mention a reference frame that includes a material having a coefficient of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$ . Accordingly, Applicants submit that a *prima facie* case of obviousness has not been established by the Examiner, and respectfully request that the rejection to claim 20, and claims 21 and 22 that depend from claim 20, be withdrawn.

Independent claim 23 recites a device manufacturing method that includes, *inter alia*, "providing a reference frame comprising a reference surface, the reference frame comprising a material having a coefficient of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$ ; and measuring a position of the substrate with respect to the reference surface." As discussed above, neither Novak et al. nor Trost disclose a reference frame, not to mention a reference frame that includes a material having a coefficient of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$ . Accordingly, Applicants submit that a *prima facie* case of obviousness has not been established by the Examiner, and respectfully request that the rejection to claim 23 be withdrawn.

In the Office Action, claims 4 and 5 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Novak et al. in view of Trost and further in view of Baker et al. (U.S. Patent No. 6,262,795). Applicants respectfully traverse this rejection.

Claims 4 and 5 depend from independent claim 1. As discussed above, claim 1 is patentable over Novak et al. in view of Trost. Baker et al. does not cure the deficiencies of Novak et al. and Trost. Baker et al. discloses an apparatus that provides an improved uniformity in intensity of light that illuminates a photoresist layer on a semiconductor device. Nowhere does Baker et al. disclose or suggest a reference frame that includes a material having a coefficient of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$ , as recited by claim 1. Accordingly, Applicants submit that a *prima facie* case of obviousness has not been established by the Examiner, and respectfully request that the rejection to claims 4 and 5 be withdrawn.

In the Office Action, claim 11 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Novak et al. in view of Trost and further in view of Shiraishi (U.S. Patent No. 6,020,950). Applicants respectfully traverse this rejection.

Claim 11 depends from claim 1. As discussed above, claim 1 is patentable over Novak et al. in view of Trost. Shiraishi does not cure the deficiencies of Novak et al. and Trost. Shiraishi discloses a fine pattern exposure transfer technique required for the manufacture of, for example, semiconductor integrated circuits. Nowhere does Shiraishi disclose or suggest a reference frame that includes a material having a coefficient of thermal expansion of greater than about  $2.9 \times 10^{-6}/K$ , as recited by claim 1. Accordingly, Applicants submit that a *prima facie* case of obviousness has not been established by the Examiner, and respectfully request that the rejection to claim 11 be withdrawn.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,  
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